# BRUHAT BANGALORE MAHANAGARA PALIKE
## BYTARAYANPURA DIVISION

**Name of Work:** Package 2 Consists of 3 Works of Rs.1100.00 Lakhs

1. Improvements to roads and drains at Kogilu and surrounding area in Ward No 05 Byatarayanapura sub division.
2. Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division.
3.Improvements to roads and drains at Hegdenagar and surrounding area in Ward No 06 Byatarayanapura sub division

## TEST REPORTS

FIFTH & FINAL BILL

**TEJUS CONSULTANTS**
**CONSULTING ENGINEERS AND DESIGNERS**
**No.45, Present BBMP No.1204/45, Old No.1204, 1st Main,**
**MRCR Layout, Bangalore-560040**
**email: tejusconsultants@gmail.com**

TEJUS
CONSULTANTS

No.TC/BBMP/BYT-PMC/802/22-23

Date: 07–04 –2023

To
The Executive Engineer
Byatarayanapura Division,
NH-7 Road, Bangalore – 560 092

Dear Sir

**Sub: Improvements to roads and drains at Kogilu, Agrahara, Hegdenagar and surrounding area in Ward No 05 and 06 Byatarayanapura sub division Package-02**

In reference to the above subject, this is to bring to your kind notice that we have scrutinized the **Fifth and Final bill** submitted by **M/s. Benaka Developers and Projects Pvt Ltd** towards the above said work and arrived at an amount of **Rs. 2,06,44,852.51/-(Rupees Two Crore Six Lakh Forty Four Thousand Eight Hundred Fifty Two And Fifty-one Paise Only)** the work has been completed satisfactorily.

This is for your kind information.

Thank you and assuring you the best of our Services at all the times

TEJUS CONSULTANTS

For Tejus Consultants
(Nischal M)

**TEJUS CONSULTANTS**
No. 45, Present BBMP No. 1204/45, Old no. 1204, 1st main, MRCR Layout, Bangalore 560040, Ph : 9611192254, 9611644110, tejusconsultants@gmail.com

# BRUHAT BANGALORE MAHANAGARA PALIKE
BYTARAYANPURA DIVISION

**Name of Work**: Package 2 Consists of 3 Works of Rs.1100.00 Lakhs

2. Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division.

## TEST REPORTS

FIFTH & FINAL BILL

TEJUS CONSULTANTS
CONSULTING ENGINEERS AND DESIGNERS
No.45, Present BBMP No.1204/45, Old No.1204, 1st Main,
MRCR Layout, Bangalore-560040
email: tejusconsultants@gmail.com

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CONSULTANTS

| | | |
|---|---|---|
| Name of Work | : | Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division |
| Client | : | Bruhat Bengaluru Mahanagara Palike |
| Consultant | : | TEJUS CONSULTANTS, BANGALORE |
| Contractor | : | M/S Benaka Developers and Projects Pvt Ltd |
| Date of Testing | : | 07-03-2023 |
| Type of Mix | : | WMM |
| Sample I/D | : | WMM 2 |

## GRADATION FOR WMM
## (As per MORT&H 400-11)

| | | | |
|---|---|---|---|
| Sample Location: | 12th c/s Road connected to jakkur Double Road(India Retail & Hospitality) | Date of Sampling: | 06-03-2023 |
| | | Date of testing: | 07-03-2023 |
| Type of material & Purpose: | WMM | Oven Dry Wt.(gms): | 10000.0 |

| IS Sieve size in mm | Weight retained | Cummulative weight retained (gm) | Cummulative % of retained | Cummulative % of passing | Specification limits |
|---|---|---|---|---|---|
| 53 | 0 | 0 | 0.00 | 100.00 | 100.00 |
| 45 | 391 | 391 | 3.91 | 96.09 | 95-100 |
| 22.4 | 2375 | 2766 | 27.66 | 72.34 | 60-80 |
| 11.2 | 2466 | 5232 | 52.32 | 47.68 | 40-60 |
| 4.75 | 1455.0 | 6687 | 66.87 | 33.13 | 25-40 |
| 2.36 | 792.0 | 7479 | 74.79 | 25.21 | 15-30 |
| 0.6 | 863.0 | 8342 | 83.42 | 16.58 | 8.0-22.0 |
| 0.075 | 988.0 | 9330 | 93.30 | 6.70 | 0-8 |
| Pan | 670.0 | 10000 | | | |
| Total | 10000.0 | | | | |

**Note:**

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2. The results indicated above are based on the tests carried out on the samples collected at site/ received in the laboratory.
3. Any Query regarding the report must be reported reported within 15days from the date of testing.
4. The material used in the site satisfied the standard of MORTH's 5th revision and hence can be used in the work.

Consultant's Representative

TEJUS CONSULTANTS
No. 58, 3rd main, 6th Cross, 1st Stage KHB Colony, Basaveshwaranagar, Bangalore - 560079, O : +91 80 23287532, tejusconsultants@gmail.com

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| | | |
|---|---|---|
| Name of Work | : | Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division |
| Client | : | Bruhat Bengaluru Mahanagara Palike |
| Consultant | : | TEJUS CONSULTANTS, BANGALORE |
| Contractor | : | M/S Benaka Developers and Projects Pvt Ltd |
| Date of Testing | : | 07-03-2023 |
| Type of Mix | : | WMM |
| Sample I/D | : | WMM 1 |

## GRADATION FOR WMM
## (As per MORT&H 400-11)

| | | | |
|---|---|---|---|
| Sample Location: | Shakthinagar from Anjaneya Temple to Dead end Road | Date of Sampling: | 06-03-2023 |
| | | Date of testing: | 07-03-2023 |
| Type of material & Purpose: | WMM | Oven Dry Wt.(gms): | 10000.0 |

| IS Sieve size in mm | Weight retained | Cummulative weight retained (gm) | Cummulative % of retained | Cummulative % of passing | Specification limits |
|---|---|---|---|---|---|
| 53 | 0 | 0 | 0.00 | 100.00 | 100.00 |
| 45 | 388 | 388 | 3.88 | 96.12 | 95-100 |
| 22.4 | 2375 | 2763 | 27.63 | 72.37 | 60-80 |
| 11.2 | 2475 | 5238 | 52.38 | 47.62 | 40-60 |
| 4.75 | 1502.0 | 6740 | 67.40 | 32.60 | 25-40 |
| 2.36 | 792.0 | 7532 | 75.32 | 24.68 | 15-30 |
| 0.6 | 860.0 | 8392 | 83.92 | 16.08 | 8.0-22.0 |
| 0.075 | 975.0 | 9367 | 93.67 | 6.33 | 0-8 |
| Pan | 633.0 | 10000 | | | |
| Total | 10000.0 | | | | |

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ಬ್ಯಾಟರಾಯನಪುರ ಉಪ ವಿಭಾಗ
ಬಿ.ಬಿ.ಎಂ.ಪ

ಸಹಾಯಕ ಕಾರ್ಯ ಪಾಲಕ ಅಭಿಯಂತರರು
ಬ್ಯಾಟರಾಯನಪುರ ಉಪ ವಿಭಾಗ
ಬಿ.ಬಿ.ಎಂ.ಪ., ಬೆಂಗಳೂರು-24

Consultant's Representative

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| | |
|---|---|
| **Project** | Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division |
| **Client** | Bruhat Bengaluru Mahanagara Palike |
| **Consultant** | TEJUS CONSULTANTS, BANGALORE |
| **Contractor** | M/S Benaka Developers and Projects Pvt Ltd |

## FLAKINESS AND ELONGATION INDICES (IS 2386, PART 1)

| | | | |
|---|---|---|---|
| **Type of Material** | WMM | **Proposed Use** | WMM |
| **Sample Location** | 12th c/s Road connected to jakkur Double Road(India Retail & Hospitality) | **Date of Sampling** | 06-03-2023 |
| | | **Date of Testing** | 07-03-2023 |

| Size of aggregate | | Flakiness Index | | Elongation Index | |
|---|---|---|---|---|---|
| **Passing through IS sieve, mm** | **Retained on IS sieve, mm** | **Total wt. of aggregate retained on sieves (A) gms.** | **Wt. of aggregate passing from Flakiness gauge (B) gms** | **Wt. of aggregate retained on Flakiness gauge (C) gms** | **Wt. of aggregate retained on Elongation gauge after retained on Flakiness gauge(D)gms** |
| 63.0 | 50.0 | 0 | 0 | 0 | 0 |
| 50.0 | 40.0 | 0 | 0 | 0 | 0 |
| 40.0 | 31.5 | 0 | 0 | 0 | 0 |
| 31.5 | 25.0 | 0 | 0 | 0 | 0 |
| 25.0 | 20.0 | 0 | 0 | 0 | 0 |
| 20.0 | 16.0 | 633 | 82 | 515 | 66 |
| 16.0 | 12.5 | 1128 | 123 | 1025 | 122 |
| 12.5 | 10.0 | 762 | 72 | 732 | 56 |
| 10.0 | 6.3 | 622 | 55 | 566 | 48 |
| **Total** | | **3145** | **332** | **2838** | **292** |

**Note:** Minimum 200 Pcs should be taken on each fraction of test

| | |
|---|---|
| Flakiness Index(%): | 10.56 |
| Elongation Index(%): | 10.29 |
| Combined FI+EI. (%) | 20.85 |

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ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ
ಬಿ.ಬಿ.ಎಂ.ಪಿ., ಬೆಂಗಳೂರು-24

Consultant's Representative

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| | |
|---|---|
| **Project** | Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division |
| **Client** | Bruhat Bengaluru Mahanagara Palike |
| **Consultant** | TEJUS CONSULTANTS, BANGALORE |
| **Contractor** | M/S Benaka Developers and Projects Pvt Ltd |

## FLAKINESS AND ELONGATION INDICES (IS 2386, PART 1)

| | | | |
|---|---|---|---|
| **Type of Material** | WMM | **Proposed Use** | **WMM** |
| **Sample Location** | Shakthinagar from Anjaneya Temple to Dead end Road | **Date of Sampling** | **06-03-2023** |
| | | **Date of Testing** | **07-03-2023** |

| **Size of aggregate** | | **Flakiness Index** | | **Elongation Index** | |
|---|---|---|---|---|---|
| **Passing through IS sieve, mm** | **Retained on IS sieve, mm** | **Total wt. of aggregate retained on sieves (A) gms.** | **Wt. of aggregate passing from Flakiness gauge (B) gms** | **Wt. of aggregate retained on Flakiness gauge (C) gms** | **Wt. of aggregate retained on Elongation gauge after retained on Flakiness gauge(D)gms** |
| 63.0 | 50.0 | 0 | 0 | 0 | 0 |
| 50.0 | 40.0 | 0 | 0 | 0 | 0 |
| 40.0 | 31.5 | 0 | 0 | 0 | 0 |
| 31.5 | 25.0 | 0 | 0 | 0 | 0 |
| 25.0 | 20.0 | 0 | 0 | 0 | 0 |
| 20.0 | 16.0 | 662 | 79 | 538 | 73 |
| 16.0 | 12.5 | 1135 | 123 | 983 | 105 |
| 12.5 | 10.0 | 772 | 58 | 735 | 55 |
| 10.0 | 6.3 | 612 | 64 | 544 | 52 |
| **Total** | | **3181** | **324** | **2800** | **285** |

**Note:** Minimum 200 Pcs should be taken on each fraction of test

| | |
|---|---|
| Flakiness Index(%): | 10.19 |
| Elongation Index(%): | 10.18 |
| Combined FI+EL (%) | 20.36 |

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ಸಹಾಯಕ ಕಾರ್ಯ ಪಾಲಕ ಅಭಿಯಂತರರು
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ಬ.ಬಿ.ಎಂ.ಪ., ಬೆಂಗಳೂರು-26

TEJUS CONSULTANTS

Consultant's Representative

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| | |
|---|---|
| **Project** | Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division |
| **Client** | Bruhat Bengaluru Mahanagara Palike |
| **Consultant** | TEJUS CONSULTANTS, BANGALORE |
| **Contractor** | M/S Benaka Developers and Projects Pvt Ltd |

## AGGREGATE IMPACT VALUE (IS: 2386 Part - 4)

| | | | |
|---|---|---|---|
| **Proposed Use** | WMM | **Date of Sampling** | 06-03-2023 |
| **Sample Location** | 12th c/s Road connected to jakkur Double Road(India Retail & Hospitality) | **Date of Testing** | 07-03-2023 |

| Sl. No. | Description | | Test No. 1 | Test No. 2 | Test No. 3 | Spec Limit (%) |
|---|---|---|---|---|---|---|
| 1 | Wt. of stone pieces (dry) passing IS Sieve 12.5mm but retained in IS sieve 10mm (gm) | (Wa) | 392.00 | 376.00 | 383.00 | |
| 2 | Wt. of the fraction retained in IS sieve 2.36mm after the impact test (gm) | (Wb) | 296.00 | 283.00 | 291.00 | |
| 3 | Wt. of the fraction passed in IS sieve 2.36mm after the impact test (gm) | (Wc) | 96.00 | 93.00 | 92.00 | |
| 4 | Aggregate Impact Value (%) | (Wc/Wa)*100 | 24.49 | 24.73 | 24.02 | |
| 5 | Average Aggregate impact value | (%) | 24.41 | | | Max - 30 % |

**Remarks :** Satisfactory / Not Satisfactory

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|---|---|
| **Project** | Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division |
| **Client** | Bruhat Bengaluru Mahanagara Palike |
| **Consultant** | TEJUS CONSULTANTS, BANGALORE |
| **Contractor** | M/S Benaka Developers and Projects Pvt Ltd |

## AGGREGATE IMPACT VALUE (IS: 2386 Part - 4)

| | | | |
|---|---|---|---|
| **Proposed Use** | WMM | **Date of Sampling** | **06-03-2023** |
| **Sample Location** | Shakthinagar from Anjaneya Temple to Dead end Road | **Date of Testing** | **07-03-2023** |

| **Sl. No.** | **Description** | | **Test No.** | | | **Spec Limit (%)** |
|---|---|---|---|---|---|---|
| | | | **1** | **2** | **3** | |
| 1 | Wt. of stone pieces (dry) passing IS Sieve 12.5mm but retained in IS sieve 10mm (gm) | (Wa) | 376.00 | 355.00 | 347.00 | |
| 2 | Wt. of the fraction retained in IS sieve 2.36mm after the impact test (gm) | (Wb) | 291.00 | 272.00 | 263.00 | |
| 3 | Wt. of the fraction passed in IS sieve 2.36mm after the impact test (gm) | (Wc) | 85.00 | 83.00 | 84.00 | |
| 4 | Aggregate Impact Value (%) | (Wc/Wa)*100 | 22.61 | 23.38 | 24.21 | |
| 5 | Average Aggregate impact value | (%) | 23.40 | | | Max - 30 % |

**Remarks :** Satisfactory / Not Satisfactory

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ಬಿ.ಬಿ.ಎಂ.ಪಿ., ಬೆಂಗಳೂರು-24

| | | |
|---|---|---|
| **Project** | Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division | |
| **Client** | Bruhat Bengaluru Mahanagara Palike | |
| **Consultant** | TEJUS CONSULTANTS, BANGALORE | |
| **Contractor** | M/S Benaka Developers and Projects Pvt Ltd | |
| **Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)** | | |
| | **Date:** | **08-03-2023** |
| **Layer no. or level** | WMM I layer | |
| **Depth of hole** | 250mm | |
| **Field density:** | **1** | **2** |
| **Chainage** | **12th c/s Road connected to jakkur Double Road(India Retail & Hospitality) at Ch:39** | **12th c/s Road connected to jakkur Double Road(India Retail & Hospitality) at Ch:82** |
| Wt. of wet material from hole (Ww) gms. | 5985 | 5993 |
| Wt. of sand+cylinder before pouring (w1) gms. | 15000 | 15000 |
| Wt. of sand+cylinder after pouring (w2) gms. | 10592 | 10587 |
| Wt. of sand in hole+ cone (w3) gms. | 4408 | 4413 |
| Wt. of cone gms. | 1080 | 1080 |
| Wt. of sand gms. | 3328 | 3333 |
| Bulk density of sand (ys)gm/cc | 1.32 | 1.32 |
| Bulk density of material(i.e. wt. of the wet material) (yb)=(Ww/w4*(ys))gm/cc | 2.37 | 2.37 |
| | | |
| Moisture meter reading(moisture content) | 6.30 | 6.30 |
| | | |
| **Result** | | |
| FDD(Wt.of the dry material)=(100yb/100+mc)gm/cc | 2.23 | 2.23 |
| MDD | 2.27 | 2.27 |
| OMC | 6.10% | 6.10% |
| % compaction obtained | 98.38 | 98.36 |
| % compaction required | 98% | 98% |

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ಬಿ.ಬಿ.ಎಂ.ಪಿ., ಬೆಂಗಳೂರು-24

| | | |
|---|---|---|
| **Project** | Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division | |
| **Client** | Bruhat Bengaluru Mahanagara Palike | |
| **Consultant** | TEJUS CONSULTANTS, BANGALORE | |
| **Contractor** | M/S Benaka Developers and Projects Pvt Ltd | |
| **Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28)** | | |
| **Date of Testing** | 10-03-2023 | |
| **Layer no. or level** | WMM I layer | |
| **Depth of hole** | 250mm | |
| **Field density:** | **1** | **2** |
| **Chainage** | **10th Cross Road in Balajikrupa Layout '@Ch:43** | **Connected to 10th c/s Road at Ch:55** |
| Wt. of wet material from hole (Ww) gms. | 5992 | 5979 |
| Wt. of sand+cylinder before pouring (w1) gms. | 15000 | 15000 |
| Wt. of sand+cylinder after pouring (w2) gms. | 10588 | 10593 |
| Wt. of sand in hole+ cone (w3) gms. | 4412 | 4407 |
| Wt. of cone gms. | 1080 | 1080 |
| Wt. of sand gms. | 3332 | 3327 |
| Bulk density of sand (ys)gm/cc | 1.32 | 1.32 |
| Bulk density of material(i.e. wt. of the wet material) (yb)=(Ww/w4*(ys))gm/cc | 2.37 | 2.37 |
| | | |
| Moisture meter reading(moisture content) | 6.20 | 6.40 |
| **Result** | | |
| FDD(Wt.of the dry material)=(100yb/100+mc)gm/cc | 2.24 | 2.23 |
| MDD | 2.27 | 2.27 |
| OMC | 6.10% | 6.10% |
| % compaction obtained | 98.47 | 98.22 |
| % compaction required | 98% | 98% |

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ಬಿ.ಬಿ.ಎಂ.ಪಿ., ಬೆಂಗಳೂರು-26

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## FLAKINESS AND ELONGATION INDICES (IS 2386, PART 1)

| | |
|---|---|
| Project : | Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division |
| Client : | BRUHAT BANGALORE MAHANAGARA PALIKE |
| Consultant : | TEJUS CONSULTANTS, BANGALORE |
| Contractor: | Benaka Developers & Project Pvt.Ltd. |

| | | | |
|---|---|---|---|
| Type of Material | BC | Proposed Use | BC |
| Sample Location | At plant | Date of Sampling | 17-03-2023 |
| | | Date of Testing | 17-03-2023 |

| Size of aggregate | | Flakiness Index | | Elongation Index | |
|---|---|---|---|---|---|
| Passing through IS sieve, mm | Retained on IS sieve, mm | Total wt. of aggregate retained on sieves (A) gms. | Wt. of aggregate passing from Flakiness gauge (B) gms | Wt. of aggregate retained on Flakiness gauge (C) gms | Wt. of aggregate retained on Elongation gauge after retained on Flakiness gauge(D)gms |
| 63.0 | 50.0 | 0 | 0 | 0 | 0 |
| 50.0 | 40.0 | 0 | 0 | 0 | 0 |
| 40.0 | 31.5 | 0 | 0 | 0 | 0 |
| 31.5 | 25.0 | 0 | 0 | 0 | 0 |
| 25.0 | 20.0 | 0 | 0 | 0 | 0 |
| 20.0 | 16.0 | 822 | 82 | 923 | 73 |
| 16.0 | 12.5 | 1332 | 135 | 1233 | 115 |
| 12.5 | 10.0 | 522 | 72 | 445 | 56 |
| 10.0 | 6.3 | 462 | 52 | 435 | 63 |
| Total | | 3138 | 341 | 3036 | 307 |

**Note:** Minimum 200 Pcs should be taken on each fraction of test

| | |
|---|---|
| Flakiness Index(%): | 10.87 |
| Elongation Index(%): | 10.11 |
| Combined FI+EL (%) | 20.98 |

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4.The material used in the site satisfied the standard of MORTH's 5th revision and hence can be used in the work.

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ಸಹಾಯಕ ಕಾರ್ಯ ನಿರ್ವಾಹಕ ಅಭಿಯಂತರರು
ಬಿ.ಬಿ.ಎಂ.ಪಿ ಬ್ಯಾಟರಾಯನಪುರ ಉಪ ವಿಭಾಗ

ಸಹಾಯಕ ಕಾರ್ಯ ನಿರ್ವಾಹಕ ಅಭಿಯಂತರರು
ಬ್ಯಾಟರಾಯನಪುರ ಉಪ ವಿಭಾಗ
ಬಿ.ಬಿ.ಎಂ.ಪಿ., ಬೆಂಗಳೂರು-26

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CONSULTANTS

## AGGREGATE IMPACT VALUE
## (IS: 2386 Part - 4)

| | | | |
|---|---|---|---|
| **Project** | Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division | | |
| **Client** | BRUHAT BANGALORE MAHANAGARA PALIKE | | |
| **Consultant** | TEJUS CONSULTANTS, BANGALORE | | |
| **Contractor** | Benaka Developers & Project Pvt.Ltd. | | |
| **Proposed Use** | BC | **Date of Sampling** | 17-03-2023 |
| **Sample Location** | At plant | **Date of Testing** | 17-03-2023 |

| Sl. No. | Description | | Test No. 1 | Test No. 2 | Test No. 3 | Spec Limit (%) |
|---|---|---|---|---|---|---|
| 1 | Wt. of stone pieces (dry) passing IS Sieve 12.5mm but retained in IS sieve 10mm (gm) | (Wa) | 385.00 | 358.00 | 357.00 | |
| 2 | Wt. of the fraction retained in IS sieve 2.36mm after the impact test (gm) | (Wb) | 293.00 | 268.00 | 272.00 | |
| 3 | Wt. of the fraction passed in IS sieve 2.36mm after the impact test (gm) | (Wc) | 92.00 | 90.00 | 85.00 | |
| 4 | Aggregate Impact Value (%) | (Wc/Wa)*100 | 23.90 | 25.14 | 23.81 | |
| 5 | Average Aggregate impact value | (%) | 24.28 | | | Max - 30 % |

**Remarks :** Satisfactory / Not Satisfactory

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## DETERMINATION OF RATE OF SPREAD TACK COAT

| | |
|---|---|
| **Name of Work :** | Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division |
| **Client :** | BRUHAT BANGALORE MAHANAGARA PALIKE |
| **Consultant :** | TEJUS CONSULTANTS, BANGALORE |
| **Contractor :** | Benaka Developers & Project Pvt.Ltd. |
| **Date of Testing :** | 19-03-2023 |
| **Type of Mix :** | Tack coat |
| **Sample I/D :** | 1 |
| **Location** | 10th Cross Road in Balajikrupa Layout and Connected to 10th c/s Road |

| Determination | Unit | Test No | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| **Location** | **Chainage** | **@39 10th c/s** | **@ 32 connectd 10th c/s** | **@ 54 connectd 10th c/s** |
| Size of Plate (mxm) | Mt | 0.30 x .30 | 0.30 x .30 | 0.30 x .30 |
| Area of Plate (a) | Sq.mtr | 0.09 | 0.09 | 0.09 |
| Initial Wt of empty Plate (b) | Kg | 0.772 | 0.769 | 0.793 |
| Final weight of plate after application of tack Coat (c) | Kg | 0.795 | 0.792 | 0.816 |
| Weight of tack Coat (d=c-b) | Kg | 0.023 | 0.023 | 0.023 |
| Rate of spread of tack coat | Kg/sq.m | 0.253 | 0.251 | 0.251 |
| Average | Kg/sq.m | 0.252 | | |
| Specified Limit | Kg/sq.m | **0.250 Kg/sq.m** | | |

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TEJUS CONSULTANTS
No. 58, 3rd main, 6th Cross, 1st Stage KHB Colony, Kodigehalli, Bangalore-560079. Ph: +91 80 2859 7866, tejusconsultants@gmail.com

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# BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE MIX

| | |
|---|---|
| **Name of Work :** | Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division |
| **Client :** | BRUHAT BANGALORE MAHANAGARA PALIKE |
| **Consultant :** | TEJUS CONSULTANTS, BANGALORE |
| **Contractor :** | Benaka Developers & Project Pvt.Ltd. |
| **Date of Testing :** | 19-03-2023 |
| **Type of Mix :** | BC |
| **Sample I/D :** | BC1 |

## DETERMINATION OF BITUMEN CONTENT

| Description | Trail 1 | Trail 2 |
|---|---|---|
| 1. Weight of Mixture before extraction, g | 931 | 883 |
| 2. Weight of Mixture after extraction, g | 882 | 837 |
| 3. Weight of Bitumen | 49 | 46 |
| 4. Weight of filter paper before extraction, g | 2.00 | 2.00 |
| 5. Weight of filter paper after extraction, g | 4.10 | 4.00 |
| 6. Weight of fines, g | 1.60 | 2.00 |
| 7. Weight of Bitumen & fines | 50.60 | 48.00 |
| 8. Bitumen content in % | 5.44 | 5.44 |
| 9. Average Bitumen content in % | 5.44 | |
| 10. Minimum Bitumen content in % | 5.40 | |

## GRADATION FOR BC AFTER EXTRACTION
(As per MORT&H 500-17,Grading-2)

| | | | |
|---|---|---|---|
| Sample Location: | 10th Cross Road in Balajikrupa Layout and Connected to 10th c/s Road | Date of Sampling: | 19-03-2023 |
| Type of material & Purpose: | BC | Date of testing: | 19-03-2023 |
| | | Oven Dry Wt.(gms) | 882.0 |

| IS Sieve size in mm | Weight retained | Cummulative weight retained (gm) | Cummulative % of retained | Cummulative % of passing | Specification limits |
|---|---|---|---|---|---|
| 19.00 | 0 | 0 | 0.00 | 100.00 | 100.00 |
| 13.20 | 77 | 77.0 | 8.73 | 91.27 | 90 - 100 |
| 9.50 | 121 | 198.0 | 22.45 | 77.55 | 70 - 88 |
| 4.75 | 132 | 330.0 | 37.41 | 62.59 | 53 - 71 |
| 2.360 | 102 | 432.0 | 48.98 | 51.02 | 42 - 58 |
| 1.180 | 105 | 537.0 | 60.88 | 39.12 | 34 - 48 |
| 0.600 | 85 | 622.0 | 70.52 | 29.48 | 26 - 38 |
| 0.300 | 72 | 694.0 | 78.68 | 21.32 | 18 - 28 |
| 0.150 | 62 | 756.0 | 85.71 | 14.29 | 12 - 20 |
| 0.075 | 70 | 826.0 | 93.65 | 6.35 | 4 - 10 |
| Pan | 56.0 | | | | |
| Total | 882.0 | | | | |

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Authorised Signatory

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ಬ.ಬಿ.ಎಂ.ಪ., ಬೆಂಗಳೂರು-26

TEJUS CONSULTANTS
No 66, 3rd main, 6th Cross, 1st Stage KHB Colony, Basaveshwaranagar, Bangalore - 560079.0 Ph: 80 23287532, tejusconsultants@gmail.com

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## BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE MIX

| | |
|---|---|
| **Name of Work :** | Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division |
| **Client :** | BRUHAT BANGALORE MAHANAGARA PALIKE |
| **Consultant :** | TEJUS CONSULTANTS, BANGALORE |
| **Contractor :** | Benaka Developers & Project Pvt.Ltd. |
| **Date of Testing :** | 25-03-2023 |
| **Type of Mix :** | BC |
| **Sample I/D :** | BC2 |

### DETERMINATION OF BITUMEN CONTENT

| Description | Trail 1 | Trail 2 |
|---|---|---|
| 1. Weight of Mixture before extraction, g | 943 | 922 |
| 2. Weight of Mixture after extraction, g | 893 | 874 |
| 3. Weight of Bitumen | 50 | 48 |
| 4. Weight of filter paper before extraction, g | 2.00 | 2.00 |
| 5. Weight of filter paper after extraction, g | 4.10 | 4.00 |
| 6. Weight of fines, g | 1.60 | 2.00 |
| 7. Weight of Bitumen & fines | 51.60 | 50.00 |
| 8. Bitumen content in % | 5.47 | 5.42 |
| 9. Average Bitumen content in % | 5.45 | |
| 10. Minimum Bitumen content in % | 5.40 | |

### GRADATION FOR BC AFTER EXTRACTION

(As per MORT&H 500-17,Grading-2)

| | | | |
|---|---|---|---|
| Sample Location: | 12th c/s Road connected to jakkur Double Road(India Retail & Hospitality) | Date of Sampling: | 25-03-2023 |
| Type of material & Purpose: | BC | Date of testing: | 25-03-2023 |
| | | Oven Dry Wt.(gms): | 893.0 |

| IS Sieve size in mm | Weight retained | Cummulative weight retained (gm) | Cummulative % of retained | Cummulative % of passing | Specification limits |
|---|---|---|---|---|---|
| 19.00 | 0 | 0 | 0.00 | 100.00 | 100.00 |
| 13.20 | 71 | 71.0 | 7.95 | 92.05 | 90 - 100 |
| 9.50 | 102 | 173.0 | 19.37 | 80.63 | 70 - 88 |
| 4.75 | 122 | 295.0 | 33.03 | 66.97 | 53 - 71 |
| 2.360 | 118 | 413.0 | 46.25 | 53.75 | 42 - 58 |
| 1.180 | 108 | 521.0 | 58.34 | 41.66 | 34 - 48 |
| 0.600 | 92 | 613.0 | 68.65 | 31.35 | 26 - 38 |
| 0.300 | 82 | 695.0 | 77.83 | 22.17 | 18 - 28 |
| 0.150 | 72 | 767.0 | 85.89 | 14.11 | 12 - 20 |
| 0.075 | 65 | 832.0 | 93.17 | 6.83 | 4 - 10 |
| Pan | 61.0 | | | | |
| Total | 893.0 | | | | |

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Authorised Signatory

TEJUS CONSULTANTS
No 58, 3rd main, 6th Cross, 1st Stage KHB Colony, Basaveshwaranagar, Bangalore - 560079, O : +91 80 23287532, tejusconsultants@gmail.com

TEJUS

| DETERMINATION OF RATE OF SPREAD TACK COAT | | | | |
|---|---|---|---|---|
| Name of Work : | Improvements to roads and drains at Agrahara and surrounding area in Ward No 05 Byatarayanapura sub division | | | |
| Client : | BRUHAT BANGALORE MAHANAGARA PALIKE | | | |
| Consultant : | TEJUS CONSULTANTS, BANGALORE | | | |
| Contractor : | Benaka Developers & Project Pvt.Ltd. | | | |
| Date of Testing : | 25-03-2023 | | | |
| Type of Mix : | Tack coat | | | |
| Sample I/D : | 2 | | | |
| Location | 12th c/s Road connected to jakkur Double Road(India Retail & Hospitality) | | | |
| Determination | Unit | Test No | | |
| | | 1 | 2 | 3 |
| Location | Chainage | @29 | @45 | @85 |
| Size of Plate (mxm) | Mt | 0.30 x .30 | 0.30 x .30 | 0.30 x .30 |
| Area of Plate (a) | Sq.mtr | 0.09 | 0.09 | 0.09 |
| Initial Wt of empty Plate (b) | Kg | 0.802 | 0.772 | 0.765 |
| Final weight of plate after application of tack Coat (c) | Kg | 0.825 | 0.795 | 0.788 |
| Weight of tack Coat (d=c-b) | Kg | 0.023 | 0.023 | 0.023 |
| Rate of spread of tack coat | Kg/sq.m | 0.251 | 0.252 | 0.252 |
| Average | Kg/sq.m | 0.252 | | |
| Specified Limit | Kg/sq.m | **0.250 Kg/sq.m** | | |

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Authorised Signatory

TEJUS CONSULTANTS
No 249, 3rd main, 6th Cross, 1st Stage KHB Colony, Basaveshwaranagar, Bangalore - 560079. O : +91 80 23287532, tejusconsultants@gmail.com

# BRUHAT BANGALORE MAHANAGARA PALIKE
## BYTARAYANPURA DIVISION

**Name of Work:** Package 2 Consists of 3 Works of Rs.1100.00 Lakhs

3.Improvements to roads and drains at Hegdenagar and surrounding area in Ward No 06 Byatarayanapura sub division

## TEST REPORTS

## FIFTH & FINAL BILL

**TEJUS CONSULTANTS**
CONSULTING ENGINEERS AND DESIGNERS
No.45, Present BBMP No.1204/45, Old No.1204, 1st Main,
MRCR Layout, Bangalore-560040
email: tejusconsultants@gmail.com

TEJUS
CONSULTANTS

| | | |
|---|---|---|
| Name of Work | : | Improvements to roads and drains at Hegdenagar and surrounding area in Ward No 06 Byatarayanapura sub division |
| Client | : | Bruhat Bengaluru Mahanagara Palike |
| Consultant | : | TEJUS CONSULTANTS, BANGALORE |
| Contractor | : | M/S Benaka Developers and Projects Pvt Ltd |
| Date of Testing | : | 16-07-2022 |
| Type of Mix | : | WMM |
| Sample I/D | : | WMM 1 |

## GRADATION FOR WMM
## (As per MORT&H 400-11)

| | | | |
|---|---|---|---|
| Sample Location: | Shabarinagar main road | Date of Sampling: | 15-07-2022 |
| | | Date of testing: | 16-07-2022 |
| Type of material & Purpose: | WMM | Oven Dry Wt.(gms): | 10000.0 |

| IS Sieve size in mm | Weight retained | Cummulative weight retained (gm) | Cummulative % of retained | Cummulative % of passing | Specification limits |
|---|---|---|---|---|---|
| 53 | 0 | 0 | 0.00 | 100.00 | 100.00 |
| 45 | 370 | 370 | 3.70 | 96.30 | 95-100 |
| 22.4 | 1788 | 2158 | 21.58 | 78.42 | 60-80 |
| 11.2 | 2255 | 4413 | 44.13 | 55.87 | 40-60 |
| 4.75 | 2015.0 | 6428 | 64.28 | 35.72 | 25-40 |
| 2.36 | 1395.0 | 7823 | 78.23 | 21.77 | 15-30 |
| 0.6 | 772.0 | 8595 | 85.95 | 14.05 | 8.0-22.0 |
| 0.075 | 880.0 | 9475 | 94.75 | 5.25 | 0-8 |
| Pan | 525.0 | 10000 | | | |
| Total | 10000.0 | | | | |

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Consultant's Representative

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ಬಿ.ಬಿ.ಎಂ.ಪಿ ಬ್ಯಾಟರಾಯನಪುರ ಉಪ ವಿಭಾಗ

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರ
ಬ್ಯಾಟರಾಯನಪುರ ಉಪ ವಿಭಾಗ
ಬಿ.ಬಿ.ಎಂ.ಪಿ., ಬೆಂಗಳೂರು-24

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| | |
|---|---|
| **Project** | Improvements to roads and drains at Hegdenagar and surrounding area in Ward No 06 Byatarayanapura sub division |
| **Client** | Bruhat Bengaluru Mahanagara Palike |
| **Consultant** | TEJUS CONSULTANTS, BANGALORE |
| **Contractor** | M/S Benaka Developers and Projects Pvt Ltd |

## FLAKINESS AND ELONGATION INDICES (IS 2386, PART 1)

| | | | |
|---|---|---|---|
| **Type of Material** | WMM | **Proposed Use** | **WMM** |
| **Sample Location** | Shabarinagar main road | **Date of Sampling** | **15-07-2022** |
| | | **Date of Testing** | **16-07-2022** |

| Size of aggregate | | Flakiness Index | | Elongation Index | |
|---|---|---|---|---|---|
| **Passing through IS sieve, mm** | **Retained on IS sieve, mm** | **Total wt. of aggregate retained on sieves (A) gms.** | **Wt. of aggregate passing from Flakiness gauge (B) gms** | **Wt. of aggregate retained on Flakiness gauge (C) gms** | **Wt. of aggregate retained on Elongation gauge after retained on Flakiness gauge(D)gms** |
| 63.0 | 50.0 | 0 | 0 | 0 | 0 |
| 50.0 | 40.0 | 0 | 0 | 0 | 0 |
| 40.0 | 31.5 | 0 | 0 | 0 | 0 |
| 31.5 | 25.0 | 0 | 0 | 0 | 0 |
| 25.0 | 20.0 | 0 | 0 | 0 | 0 |
| 20.0 | 16.0 | 648 | 76 | 545 | 70 |
| 16.0 | 12.5 | 1135 | 125 | 984 | 112 |
| 12.5 | 10.0 | 772 | 56 | 728 | 62 |
| 10.0 | 6.3 | 619 | 62 | 540 | 52 |
| **Total** | | **3174** | **319** | **2797** | **296** |

**Note:** Minimum 200 Pcs should be taken on each fraction of test

| | |
|---|---|
| Flakiness Index(%): | 10.05 |
| Elongation Index(%): | 10.58 |
| Combined FI+EL (%) | 20.63 |

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ಬಿ.ಬಿ.ಎಂ.ಪಿ ಬ್ಯಾಟರಾಯನಪುರ ಉಪ ವಿಭಾಗ

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